

PATENT SPECIFICATION

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Method of increasing the abrasion-resistance of glass.

COMPLETE SPECIFICATION

We, OWENS-ILLINOIS, INC. a Corporation of the State of Ohio, United States of America, of Toledo, Ohio, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention provides a method of increasing the abrasion-resistance of glass containers and glass containers rendered abrasion-resistant by the method.

Glass has its greatest strength when its surface is unblemished. Scratches or flaws on the surface decrease considerably the strength of the glass sometimes down to as little as one quarter of the original value. The present invention, by providing a process in which a glass surface may be rendered abrasion-resistant, provides glass having the ability to retain its strength for relatively long periods.

Accordingly the present invention provides a method of increasing the abrasion-resistance of a glass container that comprises applying to the exterior surface of the glass container a stannous salt that is pyrolyzable to form oxides of the metal while the glass is at a temperature at least as high as the pyrolyzing temperature of the stannous salt, said stannous salt being applied soon after the glass container leaves the glass forming machine and prior to the annealing of the glass container, and then cooling the glass.

Examples of stannous salts that have proved useful include stannous salts of organic acids, particularly salts of monocarboxylic acids having up to 18 carbon atoms in the molecule for example, stannous oleate, stannous stearate and stannous palmitate and stannous chloride. In addition stannous salts of naphthenic acids and other organic acids are useful.

In carrying out the method of the present invention a glass container for example, a

bottle, jar or tumbler is coated soon after the article leaves the glass forming machine and as it is being conveyed to the annealing lehr. A solution of a stannous salt is sprayed onto the exterior surface of the container while it is above the pyrolyzing temperature of the stannous salt. The temperature of the container, as it leaves the glass forming machine, is such that it is above the pyrolyzing temperature of the compound. The range of temperatures necessary to pyrolyze stannous salts is between 700° and 1300°F., depending upon the particular compound used. The preferred range is 900° to 1200°F.

The stannous salts employed for the purposes of the present invention are those that, upon contact with a heated glass surface, react to form a substantially colourless, transparent layer or coating of stannous oxide. This layer or coating adheres tightly to the surface of the glass and can have an average thickness of up to 1 micron. However preferably it has a thickness less than 1 micron.

The present application is divided from British Patent Application No. 15735/64. British Patent Application 15735/64 describes and claims a method for increasing the abrasion-resistance of a glass surface characterised by treating said surface with a titanium-, zirconium-, tin-, or vanadium containing compound which is pyrolyzable to form oxides of the metal on said glass surface while said surface is at a temperature at least as high as the pyrolyzing temperature of said compound, cooling said treated surface to a temperature below 450°F. and spraying onto said still heated glass surface an olefin polymer, or a polyurethane or a polystyrene or an acetic acid salt of an alkyl amine in an amount sufficient to form a thin, tightly adhering, transparent, substantially colourless coating on said surface.

The invention will be further described with reference to any one of the following

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Examples.

EXAMPLE 1

A newly formed glass bottle having its surface at a temperature of about 1200°F. was sprayed with stannous chloride and passed through the annealing lehr. The stannous chloride was as a 22% solution in isopropyl alcohol. The resulting bottle had good scratch resistance.

EXAMPLE 2

The procedure of Example 1 was repeated but the compound sprayed was stannous oleate in a 33% solution in isopropyl alcohol. Again the bottle produced had good scratch resistance.

WHAT WE CLAIM IS:

1. A method of increasing the abrasion-resistance of a glass container that comprises applying to the exterior surface of the glass container a stannous salt that is pyrolyzable to form oxides of the metal while the glass is at a temperature at least as high as the pyrolyzing temperature of the stannous salt, said stannous salt being applied soon after the glass container leaves the glass forming machine and prior to annealing of the glass container, and then cooling the glass.

2. A method as claimed in claim 1 in which the stannous salt is a salt of an

organic acid.

3. A method as claimed in claim 2 in which the organic acid is a monocarboxylic acid having up to 18 carbon atoms in the molecule.

4. A method as claimed in claim 2 or claim 3 in which the stannous salt is stannous oleate, stannous stearate or stannous palmitate.

5. A method as claimed in claim 1 in which the stannous salt is stannous chloride.

6. A glass container treated in accordance with the method of any of the preceding claims.

7. A method of increasing the abrasion-resistance of a glass container as hereinbefore described with reference to any one of the Examples.

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